THE ECONOMICS OF SUGAR BEET PRODUCTION — 1981

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Economics Services Division

Production Economics Branch

THE ECONOMICS

OF

SUGAR BEET PRODUCTION

IN ALBERTA

1981

BY

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FOREWORD

Sugar beets are one of the most important crops grown on irrigated farms in southern Alberta. Although this crop occupies only 15 per cent of the seeded acreage on irrigated farms, it contributes more than one-third of the total farm cash receipts. Given its importance, and because of grower concern for declining world sugar cane prices, rising production costs, and net sugar beet farm cash receipts, the Alberta Sugar Beet Growers' Association asked the Production Economics Branch to undertake a three-year study of the economics of sugar beet production in Alberta.

This first report clearly shows that in spite of the record 1981 crop of 20.39 tonnes per acre, sugar beet growers are in a very unfavorable financial position compared to the 1975-1977 period when the last study was undertaken. Growers face losses averaging $59.46 per acre or $3.12 per tonne of beets produced compared to the profitable years of 1975-1977. In addition to the low sugar prices, 1981 production costs were also 79 per cent higher than in 1977.

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I wish to express my sincere thanks to the Alberta Sugar Beet Grower's Association for their cooperation during the course of this study. Also, I wish to express my appreciation to the sugar beet growers for their cooperation in supplying us with the basic data.

Special acknowledgement is due to the field staff for their assistance in visiting the growers to familiarize them with the study and questionnaire and obtaining the necessary information required for the completion of this report. The Statistics Branch of Alberta Agriculture was very helpful in selecting a sample of growers for study.

Finally, thanks are due to the staff of the Production Economics Branch for their assistance in the preparation of this report.

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SECTION I

INTRODUCTION

The President of the Alberta Sugar Beet Growers' Association (A.S.B.G.A.) approached the Production Economics Branch of the Alberta Department of Agriculture in the early part of 1981 and requested that a cost of production study be undertaken. Production costs have risen sharply since the previous study (1975-1977), and the need for updated cost data was most obvious. Moreover, the final price for sugar beets, on a per tonne basis, has ranged from a low of $34.26 for the 1977 crop to a high of $74.05 for the 1979 crop. As such, growers are most interested in knowing about their actual financial performance.

It was agreed that the Production Economics Branch select a representative sample of sugar beet growers for survey during three production years, in order to monitor their costs and returns. The study was to be based on records obtained. The three-year study was initiated with the cooperation of the Agricultural Committee from the A.S.B.G.A. to ensure participation of an adequate number of growers.

From a 1980 list of 688 grower contracts, 51 growers with varying acreages were selected for study. They all provided detailed information for their 1981 crop year and it is from these contributions that the basis of this report is formulated.

Objectives:

The primary objective of this report is to provide the A.S.B.G.A., sugar beet growers, sugar refiners, extension personnel and the general public with factual cost of production information. It covers the first (1981) of the three study years and reflects a record year of production in terms of yield per acre. This report was undertaken to:

1. Determine and document the production costs and returns associated with sugar beets;

2. Determine the physical input/output relationships in the production of sugar beets;
3. Assist growers with farm budgeting and planning;
4. Show how variation in size of operation affects net returns;
5. Observe differences in the costs and returns for sugar beet production by location;
6. Study the effect of management practices on net returns;
7. Provide an updated economic report on sugar beet production to assist in government policy formulation.

Study Sample and Survey Method

As mentioned earlier, a sample of sugar beet growers was randomly selected from a 1980 list of contracts provided by the Alberta Sugar Company. The selected sample in each area was directly proportional to the total number of growers in each area. All of the 51 sugar beet growers initially selected for study were able to provide cost and return data for a complete economic analysis. Most participants held several contracts, but were allowed to study only one. The 51 contracts under study in 1981 represented 7.5 percent of the total sugar beet acreage in southern Alberta.

Farm calls were made during the early summer of 1981 in order to personally deliver the sugar beet questionnaires designed to record the necessary information for an economic analysis. The content of each questionnaire was fully explained to each participant with the major emphasis placed upon how he should relate his daily record keeping system to the information required for analysis.

Participants were again visited during the 1981-82 winter, so as to assist in questionnaire completion. These questionnaires were then analyzed by a computer program developed by the Systems Design Branch of Alberta Agriculture.

Sugar Beet Production in Alberta:

Canadian Sugar Factories Ltd. began refining sugar in 1925 when they purchased a refinery built in 1903 by the Knight family. The factory was known as the Knight Sugar Factory and was located at Raymond. A second factory was constructed at Picture Butte in 1935 and was in operation until the end of the 1977 campaign. The throughput of the Picture Butte factory during the last year of operation was 2283 tonnes per day. A third factory was built in Taber in 1950 and is the only plant in operation at present.

The factory at Taber was designed for a rated slice of 1530 tonnes per day, but with systematic annual improvements, the slicing capacity was increased to an average of 3880 tonnes per day for the 1978, 1979, 1980 and 1981 production years. Generally speaking, the quality of sugar beets usually determine the slicing capacity. The 1980 campaign saw an initial slicing capacity of 3840 tonnes per day which was later decreased to 3000 tonnes per day due to deterioration in the quality of sugar beets in the pile.

Slicing capacity for the 1981 campaign was a record 4200 tonnes per day and was required to process the record yielding crop of 20.39 tonnes per acre. A total of 190 slicing days were utilized in processing the 1981 crop as opposed to an average of 135 slicing days for the 1979 and 1980 crop years.

The Agricultural Stabilization Board established a floor price for sugar beet in 1958 and since then, deficiency payments have been paid for 13 years, ranging from $0.89 per tonne to $6.50 per tonne. The last deficiency payment was made in 1977 when total payment realized was $35.36 per tonne. Since then, the price of sugar beets realized by growers has been $37.98/tonne, $74.05/tonne, $66.99/tonne, and $43.18/tonne for the years 1978 to 1981 inclusive.

Table 1 provides a summary of sugar beet acreages and yields in Alberta during the last decade. The information presented indicates sugar beet production, yield per acre, and price per tonne for the past 11 years.

TABLE 1: STATISTICAL DATA ON SUGAR BEET PRODUCTION IN ALBERTA[1]

1971-1981

YEAR	CONTRACTED ACRES	HARVESTED ACRES	TOTAL TONNAGE	YIELD/[2] PLANTED ACRE	PRICE/ TONNE
1971	43610	42045	684293	14.79	21.05
1972	46014	43325	657233	13.79	21.20
1973	43018	38204	580165	13.80	51.81
1974	38726	34917	525386	13.68	56.47
1975	45986	39535	488259	11.22	40.02
1976	44186	41190	773898	17.08	32.46
1977	35464	34607	543718	15.71	34.26
1978	33559	31742	476441	15.00	37.98
1979	33793	31794	499734	15.72	74.05
1980	35609	33771	524251	15.52	66.99
1981	35405	35071	715082	20.39	43.18

[1] 57th Annual Report (1981), Alberta Sugar Beet Growers' Association; Lethbridge, Alberta

[2] Tonnes per acre.

SOUTHERN REGION

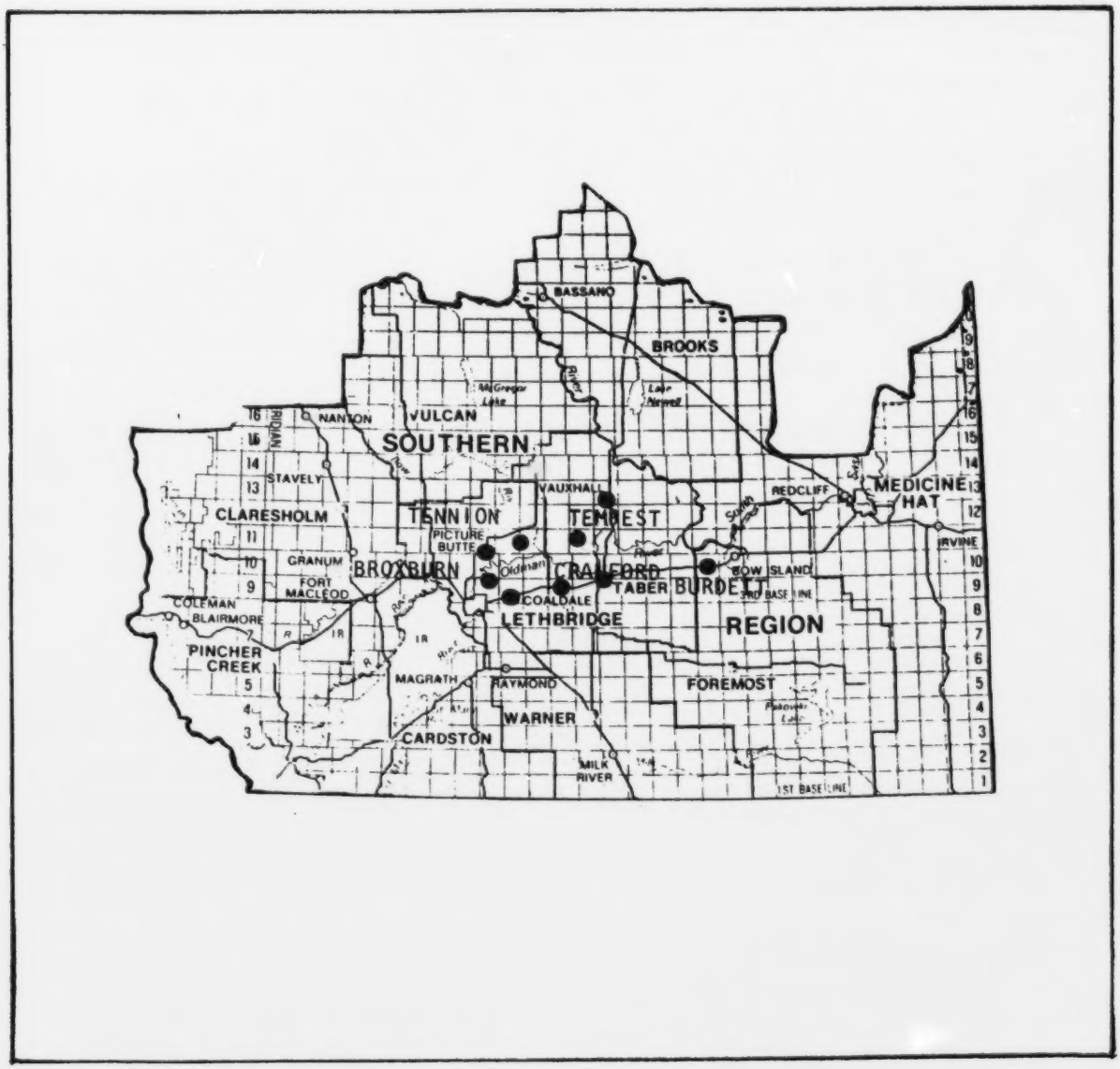


FIGURE 1: Map of southern Alberta showing the Loading Stations as used for 1981 Sugar Beet harvest

Description of Farms:

There are a wide range of crops grown on irrigated farms. Shown in Table 2 are the average acres of each crop for the farms on study, as well as, the importance of sugar beets as the main cash crop on these farms.

TABLE 2: CROPPING PATTERN - 1981

	ACRES PER FARM	PERCENTAGE OF SEEDED ACRES
Sugar Beets	66.9	15.4
Peas, Corn, Beans	24.3	5.6
Soft Wheat	153.0	35.1
Hard Wheat	49.2	11.3
Durum/Winter Wheat	15.0	3.4
Barley	59.8	13.7
Alfalfa	17.8	4.1
Potatoes	11.0	2.5
Silage	14.6	3.4
Miscellaneous	23.7	5.5
Summerfallow	37.2	-
Unseeded Acres	99.9	
TOTAL	572.4	100.0

The average sugar beet grower on study with 17.1 years of experience farmed 572.4 acres, of which 435.3 acres or 76 percent were seeded to various crops. Sugar beets were grown on 15.4 percent of the total acres or 66.9 acres.

Growing Conditions:

Sugar beet growers in southern Alberta harvested a record yielding crop of 20.4 tonnes per acre in 1981, which was 5 tonnes above the previous five year average. Planting of sugar beets in 1981 took place in early April, with some replanting done later in April, following strong winds on April 24, 1981. The sugar beet growing areas experienced rain on May 7 and 8, with some areas receiving more rain a week later, resulting in some soil crusting and re-seeding. Other problems experi-

enced by growers resulted from insects such as root maggot, flea beetle, wireworm, carrian spinach beetle, and weed chemical damage caused by wind, insects, humidity and soil crusting. However, these problems were quite minimal as only 1760 acres or 5 percent of the total sugar beet area was re-seeded. The highest yield recorded in 1981 was 29.67 tonnes per acre in the Vauxhall area.

METHOD OF ANALYSIS:

All costs and returns data provided in this report are based on planted acres. In the summary tables, costs were calculated on a per acre basis by dividing the sum of all expenses by the total planted acres. In some cases, certain cost items were not incurred in an individual operation. As such, cost per unit for different inputs were averaged to determine the cost per acre or per tonne sold.

Returns: Returns from sugar beet production were divided into three categories namely:

1. Returns from sugar beet sales;
2. Hauling allowance;
3. Value of sugar beet tops.

The 1981 sugar beet crop at time of data analysis was valued at $41.00 per tonne as estimated by the Alberta Sugar Company. However, sugar beet growers received a total of $43.18 per tonne for the 1981 crop and the information provided in the tables was adjusted to reflect the actual return. Sugar beet tops were valued according to top growth, and were only valued by those participants utilizing sugar beet tops for livestock feeding. A general trend has been towards the use of the defoliator which facilitates the incorporation of crop residue into the soil. The average value for sugar beet tops for the study sample was $7.09 per acre or $0.37 per tonne in 1981.

A few farmers realized additional income by hauling sugar beets directly to the Taber refinery in 1981. The hauling

allowance schedule (Table 3) was also used in 1981 to compensate sugar beet growers with Raymond contracts, for hauling their sugar beets to the Coaldale contract station. Hauling allowance averaged $3.87 per acre or $0.20 per tonne for the study group in 1981.

TABLE 3: HAULING ALLOWANCE PAID IN 1981 FOR SUGAR BEETS DELIVERED TO THE TABER REFINERY

DISTANCE (MILES)	HAULING ALLOWANCE $/TONNE	DISTANCE (MILES)	HAULING ALLOWANCE $/TONNE
0- 5.9	FREE ZONE	18-18.9	1.11
6- 6.9	0.18	19-19.9	1.17
7- 7.9	0.29	20-20.9	1.23
8- 8.9	0.41	21-21.9	1.30
9- 9.9	0.52	22-22.9	1.36
10-10.9	0.61	23-23.9	1.42
11-11.9	0.68	24-24.9	1.48
12-12.9	0.75	25-25.9	1.54
13-13.9	0.81	26-26.9	1.60
14-14.9	0.87	27-27.9	1.67
15-15.9	0.93	28-28.9	1.73
16-16.9	0.99	29-29.9	1.79
17-17.9	1.05	over 30	1.85

Labour

Only a few sugar beet growers were able to perform all the necessary machine operations without employing a hired man.

All of the operators used hired labour on a contract basis for either thinning, hoeing or weeding operations. Where a mechanical thinner was used, the hoeing and weeding operations were usually done on a contract basis. Hired wage labour was valued at the actual amount paid. The majority of the growers on study utilized hired wage labour during the harvesting operation, specifically for hauling sugar beets to the loading station. In 1981, the average sugar beet grower with 51.81 planted acres utilized 236.66 hours of wage labour, or 4.87 hours per acre, at an

average value of $5.82 per hour. The operator's labour was valued between $6.75 to $7.00 per hour.

Machine Costs: Study participants provided an inventory of their equipment used on sugar beet land. Hourly operating and ownership costs for each machine were obtained from the publication: "Farm Machinery Costs", March, 1980. These were then updated to reflect machine costs for the spring and summer of 1981. Thus, the most current machinery data were used based on replacement, interest, insurance, housing, variable costs of fuel, lubrication and repairs. Custom machine operations were charged at the actual rate paid.

Materials: Most supplies such as seed, fertilizers, herbicides, and insecticides were purchased through the Alberta Sugar Company, and were valued at the actual prices paid. Barnyard manure was applied on the sugar beet land by some participants. The manure itself was not valued, but the cost of manure spreading was allocated towards the 1981 sugar beet crop. It is recognized that manure will have a significant effect on the subsequent crop.

Cash Overhead: Included in the category of overhead costs are the following cash cost items: crop insurance, association fees, land and water taxes, building and equipment insurance, utilities, and miscellaneous overhead. These costs are basically fixed annual charges and were recorded at the actual paid value. Association fees of 15 cents per tonne were deducted from the November 6, 1981 and December 6, 1981 initial payments. Also included in this category of costs is the interest on operating capital, calculated by applying an interest rate of 18 percent on all cash costs for a six month period.

Real Estate: Each sugar beet grower on study indicated the value of his land based on the market value of similar land in the area. Realizing an inflationary return on land of approximately 5 percent, interest on land investment was calculated using 7 percent. However, for study participants who used rented land (cash rented or crop shared), the actual cash paid or crop valued at $41.00 per tonne was used to reflect the land value.

Sugar beet growers, provided a listing of all buildings and other permanent facilities (roads, ditches, natural gas lines), used in sugar beet production. The age, market value and percentage of use to the sugar beet enterprise were also given, so as to calculate depreciation and interest costs. The interest rate used in assessing the opportunity cost on money invested in buildings and other permanent facilities was 12 percent.

Every participant on study provided an accurate description of each machine and hours used in the production of the 1981 crop. With this information, the hourly and total ownership costs were determined using the updated version of the publication: "Farm Machinery Costs", March, 1980. Ownership costs include depreciation, interest (calculated at 12 percent), insurance, and housing.

SECTION II

SUMMARY OF COSTS AND RETURNS FOR THE STUDY SAMPLE

Returns From Sugar Beet Sales:

In 1981, average sugar beets sold per producer was 993.43 net tonnes (1058.0 gross tonnes), which is an average of 19.05 tonnes per planted acre. With sugar beet yields varying from 12.38 tonnes per acre to 26.48 tonnes per acre, study participants experienced a considerable range in returns. The average sugar beet grower on study received a gross income of $822.75 per acre or $43.18 per tonne from the sale of sugar beets.

In addition to income from sugar beets, some participants (3.7 percent) indicated an additional return from sugar beet tops as they were used for livestock feeding. These additional returns ranged from $6.43 per acre to $50.00 per acre, with the average being $23.28 per acre for the 19 farms reporting a value. The weighted average return from sugar beet tops for all 51 contracts on study was $7.09 per acre or $0.37 per tonne of sugar beets sold.

As indicated in Section I, operators hauling their sugar beets directly to the Taber refinery, as well as, Raymond operators who hauled their sugar beets to the Coaldale loading station in 1981, were compensated in the form of a hauling allowance when the distance exceeded 5.9 miles. Only 9 growers or 17.6 percent of the study participants received a hauling allowance in 1981. The hauling allowance ranged from $3.63 per acre to $61.15 per acre with the group average at $3.87 per acre or $0.20 per tonne.

Table 4 presents a summary of the group average returns for the 1981 sugar beet crop.

TABLE 4: SUMMARY OF SUGAR BEET RETURNS - 1981

	$ PER ACRE	$ PER TONNE
Sugar Beet Income	822.58	43.18
Sugar Beet Tops	7.09	0.37
Hauling Allowance	3.87	0.20
Total	833.54	43.75

Direct Cash Expenses

a) Machine Operating Costs

All cost information provided in this report are based on planted acres. In the summary table, costs were calculated on a per acre basis by dividing the sum of all expenses by the total planted acres. Therefore, the cost and return information as presented throughout this report are weighted on the basis of acres. One should bear in mind that if the viability of an enterprise is to be maintained, then returns should be sufficient to cover cash costs.

Expenditure for machinery fuel and repairs accounted for 32 percent of the total cash costs in 1981. Fuel and repair costs for the average contract on study (51.81 planted acres), amounted to $8368.66 or $161.52 per acre. Machinery operating costs as reported in the report: "Farm Machinery Costs 1980" were updated to reflect the 38.5 percent increase in the cost of petroleum products and 9.2 percent increase in the cost of repairs.

Table 5 provides a breakdown of the operating costs as incurred by the average study participant during the pre-season, seeding, summer, and harvesting operations. Pre-season work included all operations performed after the previous crop was harvested, and for sugar beets grown on summerfallow land, included all summerfallow operations. Summer operations included mainly row cultivating and irrigating machine costs. Harvesting operation costs included topping, defoliating, digging, and hauling.

TABLE 5: SUMMARY OF MACHINE OPERATING COSTS - 1981

	TOTAL FUEL REPAIRS COST($)	FUEL-REPAIR COST PER ACRE($)	PERCENT OF TOTAL
Pre-Season	1386.78	26.77	16.6
Seeding	219.91	4.24	2.6
Summer	1529.07	29.51	18.3
Harvesting	5232.89	101.00	62.5
TOTAL	8368.66	161.52	100.0

Irrigation is the main summer operation for sugar beet growers and accounts for 62 percent ($18.40 per acre) of the fuel and repair costs incurred during summer. Hauling of sugar beets is the most significant of harvesting operations in terms of costs, as it accounts for 62 percent ($62.83 per acre) of the total fuel and repair costs. These two operations (irrigation and hauling) when combined together accounted for 50.3 percent of the total fuel and repairs costs incurred in the growing of sugar beets in 1981.

b) Material Costs

Material costs in 1981 for the average contract on study were $123.32 per acre or 24.7 percent of the total cash costs. Thus, basic inputs were the second most significant cash cost item. Table 6 is an indication of the average cost and range of costs for the basic inputs: seed, fertilizer, herbicide and insectide.

TABLE 6: SUMMARY OF MATERIAL COSTS - 1981

INPUT	FREQUENCY	AVERAGE COST $/ACRE	RANGE $/ACRE
Seed	51	18.57	1.80 - 50.63
Fertilizer	51	73.05	27.38 -131.60
Herbicide	49	27.67	2.42 - 79.65
Insecticide	16	4.03	4.30 - 39.06
TOTAL		123.32	

The range in input costs is substantial as material cost varied from $44.73 per acre to $209.56 per acre.

c) Hired Labour and Custom/Contract Work

The third most significant cash cost on sugar beet farms was hired labour and custom/contract work. Together, these two items totalled $95.81 per acre or 19.2 percent of the total cash costs. High labour requirements are still considered to be the greatest problem encountered in producing sugar beets, and this is further compounded by the fact that labour demands are seasonal. Some sugar beet growers have minimized their labour requirements by adopting practices such as herbicide incorporation, mechanical thinning and space planting. The average study participant utilized a total of 218.1 hours of hired wage labour which is an average of 4.21 hours per acre. Rates per hour and distribution of this hourly use are shown in Table 7.

TABLE 7: HIRED LABOUR USE AND COST - 1981

	HIRED LABOUR HOURS	HOURLY RATE ($)	TOTAL COSTS ($)
Pre-Season	21.53	5.50	118.33
Seeding	3.76	5.26	19.76
Summer	16.30	6.63	108.04
Harvest	176.50	6.78	1196.26
TOTAL	218.10	6.61	1442.39

The average sugar beet grower on study spent $1,442.39 per acre or $6.61 per hour for hired wage labour.

TABLE 8: LIST OF CUSTOM/CONTRACT OPERATIONS - 1981

OPERATION	FREQUENCY	COST PER ACRE ($)	RANGE ($)
Weeding	12	19.12	10.00 - 32.06
Thinning	7	29.00	22.00 - 30.59
Hoeing	10	20.23	5.00 - 32.81
Thinning-Weeding	16	50.45	19.14 - 65.00
Weed-Thin-Hoe	15	65.19	37.51 - 95.00
Fertilizer Spreading	13	2.29	1.33 - 3.80
Spraying	10	5.88	1.64 - 12.00
Manuring	5	23.93	13.87 - 40.98
Hauling Sugar Beets	11	44.18	13.02 - 73.71

Table 8 lists the common custom/contract operations and frequency, the range in cost per acre incurred for such services, and the average

cost per acre. For the average participant on study, a total of $67.97 was spent per acre for custom/contract work in 1981.

d) Cash Rent/Crop Share

Approximately 29.4 percent of the study participants had either cash rent or crop share arrangements for the sugar beet acres under study. The total cost of the cash lease was recorded as a cash cost and in many cases was a lump sum for a quarter section, for which only a portion was allocated to the sugar beet enterprise. Whenever the tenant agreed to pay the landlord a portion of the crop, the actual cost was determined by valuing the landlord's tonnage at $41.00 per tonne. The 15 study participants who had tenant-landlord agreements in 1981, paid an average of $120.92 per acre for sugar beet land. However, when this cost is spread over the entire group of participants, the cost of cash rent-crop share is $36.89 per acre.

e) Cash Overhead

The items included under cash overhead are crop insurance, association fees, land and water taxes, building and equipment insurance, utilities, and miscellaneous. Table 9 shows the average cost for these items. Only 7.8 percent of the study sample (4 participants) had acquired crop insurance, ranging from $2.64 to $11.08 per acre. The average crop insurance cost for the entire study group was $0.52 per acre. Association fees were deducted from the the sugar beet growers at the time of initial sugar beet payments. Land and water taxes are fixed annual charges and must be paid by all producers. Some participants who had a cash lease or crop share agreement did not pay any land or water taxes. As building and equipment insurance, along with utilities are lump sum expenditures for the total farm, the study participants were asked to allocate a portion to the sugar beet enterprise. Interest on operating capital was calculated using 18 percent for a six month period.

TABLE 9: SUMMARY OF CASH OVERHEAD COSTS - 1981

ITEM	GROUP AVERAGE COST $/ACRE
Crop Insurance	0.52
Association Fees	2.83
Land Tax	3.46
Water Tax	7.87
Bldg., Equip., Labour Ins.	8.08
Utilities	6.07
Miscellaneous Overhead	11.17
Interest on Opr. Cap.	41.18
TOTAL	81.18

Non-Cash Overhead

Each participant on study indicated the market value of his land so that an opportunity cost could be calculated for sugar beets grown on owned land. The land values obtained ranged from $1000.00 to $2000.00 per acre. Realizing an inflationary return on land of approximately 5 percent, interest on land investment was calculated using 7 percent. For the group, the average opportunity cost on land investment was $82.76 per acre. The group average land value in 1981 was $1661.74 per acre.

Depreciation and interest costs were calculated for the buildings and improvements that were used in sugar beet production. Depreciation on buildings was calculated by using a percentage of the market value appropriate to the sugar beet enterprise, an assumed salvage value of 10 percent, and the estimated years of life remaining. Under the heading of building were included a portion of the operator's home, sugar beet labour houses, machine sheds, and garages. In each case, the study participant indicated the portion that would apply to the sugar beet contract that was on study. Improvements included non-depreciable assets such as natural gas lines, roads and ditches for which only opportunity interest costs were calculated. The average participant on study in 1981 indicated a market value of $18,145.05 ($350.22 per acre) for buildings and improvements.

Approximately 72.4 percent of the hourly labour requirements for sugar beet production were supplied by the operator himself. For the purpose of this study, all operator labour was valued at $7.00 per hour.

The group average value for operator's labour in 1981 was $77.15 per acre for the 11.02 hours that he spent per acre.

TABLE 10: SUMMARY OF NON-CASH OVERHEAD - 1981

ITEM	GROUP AVERAGE $/ACRE
Land Interest	82.76
Machinery Interest Depreciation	195.80
Building Interest Depreciation	38.56
Operator's Labour	77.15
TOTAL	394.27

Summary of Costs and Returns

Table 11 summarizes the costs and returns for the 1981 sugar beet crop year.

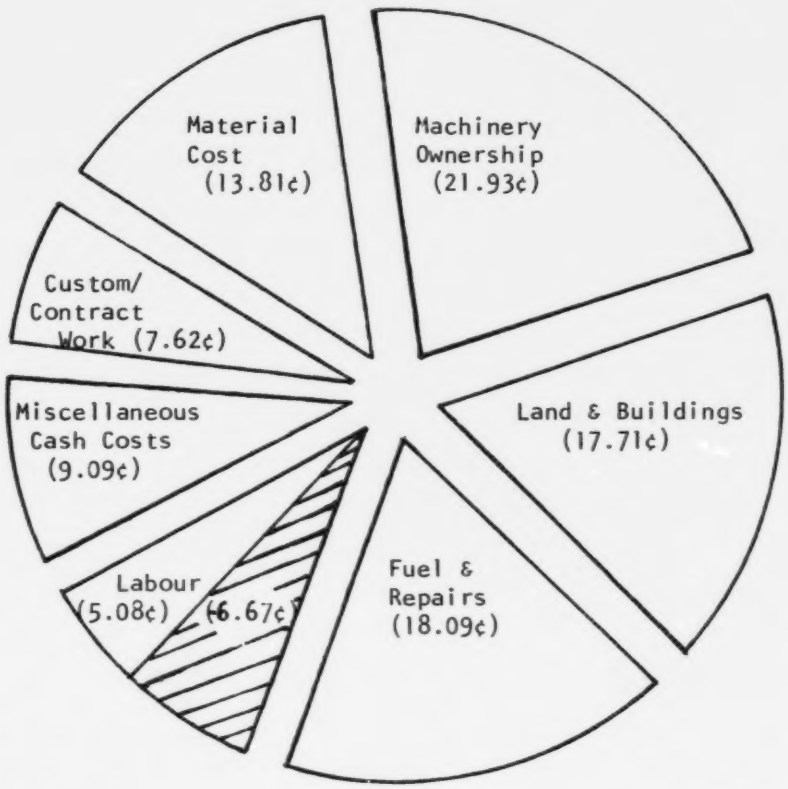
TABLE 11: SUMMARY OF COSTS AND RETURNS - 1981

	GROUP AVERAGE $/ACRE	GROUP AVERAGE ($/TONNE)	PERCENT OF TOTAL
Returns			
Sugar Beet Sales	822.58	43.18	98.70
Sugar Beet Top Value	7.09	0.37	0.85
Hauling Allowance	3.87	0.20	0.45
TOTAL RETURNS	833.54	43.75	100.00
Cash Costs			
Machine Operation	161.52	8.48	18.09
Materials	123.32	6.47	13.81
Custom/Contract Work	67.97	3.57	7.62
Cash Rent/Crop Share	36.89	1.94	4.14
Hired Wage Labour	27.84	1.46	3.11
Cash Overhead	81.18	4.26	9.09
TOTAL CASH COSTS	498.73	26.18	55.86
Non-Cash Costs			
Land	82.76	4.34	9.26
Building Ownership	38.56	2.02	4.31
Machinery Ownership	195.80	10.28	21.93
Operator's Wage Labour	77.15	4.05	8.64
TOTAL NON-CASH COSTS	394.27	20.69	44.14
TOTAL PRODUCTION COSTS	892.99	46.88	100.00
Return Over Cash Costs $/Ac	334.81	17.57	
Return to Management $/Ac	-59.45	-3.13	
Breakeven to Cover Cash Costs $/tonne	26.18	-	
Breakeven to Cover All Costs $/tonne	46.88	-	

In general, it indicates that sugar beet growers experienced a negative return to management of $59.45 per acre ($3.13 per tonne), from their 1981 sugar beet crop. This net return figure is not favourable when considering the fact that yields in 1981 were 39.4 percent higher than the average of the previous 10 years. Cash costs in sugar beet production represent 55.85 percent of the total production costs. The non-cash costs account for 44.15 percent of the total production costs. It should be noted that machinery operating and ownership costs together represent 40.0 percent of the total production costs of sugar beets.

The pie graph shown in Figure 2 shows the breakdown of each dollar received from sugar beet sales into the various expenditures and net income categories for the study sample.

FIGURE 2: DIVISION OF SUGAR BEET DOLLAR



As sugar beet returns were short of covering total production costs, it was assumed that the operator would take a lower wage for his labour. Therefore, the negative return to management (-6.67 cents out of every dollar) is shown as being taken out of the labour pie.

SECTION III

EFFECT OF SIZE OF OPERATION

To determine whether the size of operation had any effect on net returns, study participants were divided by size of operation into four categories. The size groups (analyzed on the basis of total number of acres) for sugar beets grown were: less than 40; 40-69; 70-99; and 100 and over.

A basic characteristic of agricultural enterprises is that the production unit becomes more efficient as the scale of operation increases. However, beyond a certain size, diseconomies of scale usually occur as a result of limitations in management, capital, machinery, etc. As the size of operation increases, cost savings can be expected in the areas of operation and fixed investment components. For example, specialized sugar beet equipment costs will be spread over a wider base as the number of acres increase. Operating cost savings can come about from the use of larger equipment, bulk buying, and more efficient use of labour and management. Lower production costs (per tonne of sugar beets) with increased size would result in increased returns to management.

Returns From Sugar Beet Production by Size of Operation

Table 12 presents costs and returns information on sugar beet production for four different size categories. A general observation is that yields and consequent returns increased with size of operation. Production per acre averaged 19.75 tonnes for the two groups of growers with more than 70 acres of sugar beets to 18.63 tonnes for the two groups of growers with less than 70 acres. The two smaller size groups (less than 40 acres and 40-69 acres) utilized sugar beet tops for livestock feed and reported an average feed value of $12.66 per acre for the sugar beet residue. Larger operators used defoliators to assist in the incorporation of sugar beet tops into the soil and therefore reported an average value of $2.45 per acre for sugar beet tops.

TABLE 12: SUMMARY OF COSTS AND RETURNS BY SIZE OF OPERATION -1981

	GROUP AVERAGE	LESS THAN 40 ACRES	40-69 ACRES	70-99 ACRES	OVER 100 ACRES
NUMBER OF FARMS	51	17	15	10	9
AVERAGE YIELD (t/Ac)	19.05	18.55	18.71	20.08	19.41
RETURNS	- - - - - - - - - - - - $ PER ACRE - - - - - - - - - -				
Sugar Beet Sales	822.58	800.99	807.90	867.05	838.12
Sugar Beet Tops	7.09	12.20	13.12	1.66	3.24
Hauling Allowance	3.87	0.37	3.92	3.53	6.20
TOTAL RETURNS	833.54	813.56	824.94	872.24	847.56
CASH COSTS					
Machine Operation	161.52	195.00	179.11	163.90	123.29
Materials	123.32	109.24	134.49	119.56	124.61
Custom/Contract Work	67.97	81.55	59.61	64.46	70.78
Cash Rent/Crop Share	36.89	52.70	19.12	52.07	30.72
Hired Wage Labour	27.84	25.41	37.67	21.88	25.38
Cash Overhead	81.18	97.51	90.08	74.53	69.11
TOTAL CASH COSTS	498.73	561.41	520.08	496.40	443.89
NON-CASH COSTS					
Land	82.76	75.95	94.30	68.54	88.55
Building Ownership	38.56	57.80	41.04	38.81	24.66
Machinery Ownership	195.80	243.42	208.04	200.00	152.61
Operator's Wage Labour	77.15	122.57	72.86	80.00	51.76
TOTAL NON-CASH COSTS	394.27	499.74	416.24	387.35	317.58
TOTAL PRODUCTION COSTS	892.99	1061.15	936.33	883.75	761.48
RETURN OVER CASH COSTS	334.81	252.15	304.86	375.84	403.67
RETURN TO MANAGEMENT	-59.45	-247.59	-111.39	-11.51	86.08
BREAKEVEN YIELD TO COVER CASH COSTS (t/Ac)	11.40	12.80	11.79	11.43	10.16
BREAKEVEN YIELD TO COVER ALL COSTS (t/Ac)	20.41	24.19	21.24	20.34	17.44

Hauling allowance generally increased with size of operation as larger operators with their bigger trucks were in a position to haul their sugar beets a further distance directly to the factory. For example, hauling allowance income of $0.37 and $6.20 per acre were reported for the small and large size groups, respectively. The range in total returns per acre varied from $813.56 to $872.24 for the four groups studied.

Cash Production Costs by Size of Operation

Referring back to Table 12 indicates that there are definite economies of scale with regard to labour expenses, as the scale of operation increases. As farms increase in size, there is a gradual substitution of hired labour. That is, the use of larger equipment, chemical weed control and mechanical thinning are examples of management techniques used to reduce labour input. As a result, larger enterprises are able to realize a saving in labour costs when compared to the smaller enterprises. Total labour costs per acre ranged from $147.98 for the group with less than 40 acres to $77.14 for the group with over 100 acres.

The category of sugar beet growers with less than 40 acres had the highest machine costs. Spreading out the fixed costs of machine ownership over more acres along with the lower time requirements for farms with larger equipment, accounted for the lower machine costs as scale of operation increased. Total machine operating and ownership costs ranged from a high of $438.42 per acre for the less than 40 acre size category to $275.90 per acre for the over 100 acre size category.

TABLE 13: SUMMARY OF MATERIAL COSTS BY FARM SIZE - 1981

	LESS THAN 40 ACRES	40-69 ACRES	70-99 ACRES	OVER 100 ACRES
			$/ACRE	
Yield (t/Ac)	18.55	18.71	20.08	19.41
Seed	15.38	19.96	19.83	18.08
Fertilizer	68.67	72.80	76.55	72.79
Chemicals	25.19	41.73	23.18	33.74
TOTAL	109.24	134.49	119.56	124.61

A general observation that can be made with regards to material use and size of farm (refer to Table 13) is as follows: farms with less than 40 acres of sugar beets had a lower seed, fertilizer and chemical cost when compared to the other three size categories. This size category had also reported a relatively lower yield. The second size category (40-69 acres) had the highest material cost per acre. One would have expected fertilizer expenditures to decrease moderately as farm size increased, not due to a different application rate, but because of purchasing bulk quantities at lower prices. Chemical costs would be expected to increase with larger size operations in an effort to minimize the labour requirement.

TABLE 14: SUMMARY OF CASH OVERHEAD COSTS BY FARM SIZE - 1981

	1-39 ACRES	40-69 ACRES	70-99 ACRES	OVER 100 ACRES
	$ PER ACRE			
Crop Insurance	-	-	1.05	0.84
Association Fees	2.78	2.92	2.86	2.75
Land Tax	3.74	5.00	2.95	2.32
Water Tax	9.26	8.98	5.52	8.09
Building & Equip. Ins.	12.85	9.89	7.88	3.75
Utilities	12.21	6.49	4.24	3.64
Miscellaneous Overhead	7.30	10.74	7.90	7.72
Interest on Oper. Cap.	46.36	42.94	40.99	36.65
TOTAL	94.50	86.96	73.39	65.76

Total cash overhead costs (Table 14), decreased as the sugar beet enterprise increased in size in 1981. More noticeable cost decreases were observed for building and equipment insurance, and utilities for which the range was $12.85 to $3.75 per acre and $12.21 to $3.64 per acre, respectively. Due to relatively high cash expenditures, interest charges on operating capital were the highest for the 1-39 acre size category at $46.36 per acre as compared to $36.65 per acre for the over 100 acre size category. Total overhead costs were observed to range

from $94.50 per acre for the smallest size category to $65.76 per acre for the largest size category.

Non-Cash Production Costs by Size of Operation

Non-cash overhead costs are shown in Table 15:

TABLE 15: SUMMARY OF NON-CASH OVERHEAD COSTS BY FARM SIZE - 1981

	1-39 ACRES	40-69 ACRES	70-99 ACRES	OVER 100 ACRES
	$ PER ACRE			
Operator's Labour	122.57	72.86	80.00	51.76
Machine Int., Deprec.	243.42	208.04	200.00	152.61
Building Int., Deprec.	57.80	41.04	38.81	24.66
Land Interest	75.95	94.30	68.54	88.55
TOTAL	499.74	416.24	387.35	317.58

As is evident from the Table, economies of scale were significant for all cost items. For example, the costs for operator's labour, machinery ownership, and building ownership decreased as the size of the sugar beet enterprise increased. This cost-size relationship as observed in 1981 was anticipated, as larger farms are able to spread out their fixed costs over more acres.

Summary of Costs and Returns By Size of Operation

Total cost per acre decreased significantly with increasing enterprise size in 1981, due to mainly to advantages of economies of scale for machine use, reduced labour requirements and a lower non-cash overhead. Considering the data presented in this section, some of the general conclusions that can be drawn are:

1. There was a yield and return difference for the four size groups studied. Average yield was observed to be 1.12 tonnes per acre higher for the two larger size groups as compared to the two smaller size groups.

2. Due to economies of scale, larger farms can produce sugar beets at considerably lower costs per acre (resulting in increasing net returns), than smaller farms.

3. The breakeven yield required to cover cash costs was 12.80 tonnes per acre for the 1-39 acre size category and 10.16 tonnes per acre for the over 100 acre size category. Breakeven yields required to cover total production costs were much more significant at 24.19 tonnes per acre for the 1-39 acre size category versus 17.44 tonnes per acre for the over 100 acre size category.

4. The total realized return for the 1981 sugar beet crop was $43.75 per tonne (includes hauling allowance and beet top values). Breakeven prices per tonne required to cover total production costs were $56.53, $49.13, $43.75, and $38.74 per tonne for the 1-39, 40-69, 70-99, and over 100 acre size categories, respectively.

SECTION IV

EFFECT OF LOCATION

In order to analyze the economics of sugar beet production by location within the sugar beet growing area of southern Alberta, the 51 records obtained were divided into the following three main areas: LETHBRIDGE - 14 records obtained from Coaldale, Lethbridge, Tempest, and Broxburn areas; TABER - 23 records obtained from the Taber, Bow Island, Cranford, and Barnwell areas; VAUXHALL - 14 records obtained from Picture Butte, Vauxhall, Turin and Tennion areas.

Returns From Sugar Beet Production By Location

Returns from sugar beet production are directly related to yield. However, hauling allowances received and the value of sugar beet tops are known to vary from farm to farm. Sugar beet yields (refer to Table 16), ranged from 18.12 tonne per acre in the Vauxhall area to 20.34 tonnes per acre in the Lethbridge area, which in terms of actual returns is a difference of $95.86 per acre. In the Taber area, growers averaged 18.83 tonnes per acre. Income received from hauling allowances was directly related to the distance from the Taber refinery and was paid only on the tonnage hauled to the factory. This was also true for the Raymond tonnage that was hauled to the Coaldale loading station. As expected, growers in the Taber area realized the least amount of income from hauling allowance at $1.67 per acre while the Vauxhall growers reported a hauling allowance of $7.47 per acre. The Lethbridge area had an average hauling allowance of $4.13 per acre. Value of sugar beet tops were $9.18, $7.12, and $3.32 per acre for the Taber, Lethbridge, and Vauxhall areas, respectively.

TABLE 16: SUMMARY OF COSTS AND RETURNS FOR SUGAR BEET PRODUCTION BY LOCATION - 1981

LOCATION	Lethbridge Area		Taber Area		Vauxhall Area	
ACRES ON FARM	58.9		50.65		46.44	
NUMBER OF FARMS	14		23		14	
	- - - - - - - - - - $ PER ACRE - - - - - - - - - - - - - - - -					
RETURNS						
Yield (t/Ac)	20.34		18.83		18.12	
Sugar Beet Sales	878.28		813.08		782.42	
Hauling Allowance	4.13		1.67		7.47	
Sugar Beet Tops	7.12		9.18		3.32	
TOTAL RETURNS	889.53	43.73/t	823.93	43/76/t	793.21	43.78/t
CASH COSTS						
Labour (Hired)	27.92		27.75		27.89	
Contract Work	71.49		63.88		70.82	
Materials	138.55		110.34		127.26	
Machine	153.05		156.18		181.69	
Miscellaneous	114.66		108.33		139.83	
TOTAL CASH	505.67	24.86/t	466.48	24.72/t	547.49	29.26/t
NON-CASH COSTS						
Land	112.18		80.30		50.02	
Buildings	33.05		41.60		40.10	
Machinery	176.54		199.64		213.28	
Operator's Labour	71.60		80.03		79.00	
TOTAL NON-CASH	393.37	19.34/t	401.57	21.33/t	382.40	21.10/t
TOTAL COSTS	899.04	44.20/t	868.05	46.10/t	929.89	51.32/t
RETURN OVER CASH COSTS	383.86	18.87/t	357.45	18.98/t	245.72	13.56/t
RETURN TO MANAGEMENT	-9.51	-0.47/t	-44.12	-2.34/t	-136.68	-7.54/t
BREAKEVEN YIELD TO COVER ALL COSTS(t/Ac)	20.56		19.84		21.24	

Cash Production Costs by Location

The total cash cost per tonne of sugar beets produced as shown in Table 17 ranged from $24.72 in the Taber area to $30.21 in the Vauxhall area.

TABLE 17: SUMMARY OF CASH COSTS BY LOCATION - 1981

Cash Costs	Lethbridge Area		Taber Area		Vauxhall Area	
	$ per Acre					
Labour (Hired)	27.92		27.75		27.89	
Contract/Custom Work	71.49		63.88		70.82	
Fertilizer	89.87		61.07		73.17	
Seed	16.95		18.41		20.91	
Chemicals	31.73		30.86		33.18	
Machine Operation	153.05		156.18		181.69	
Cash Rent/Crop Share	28.22		34.22		52.59	
Crop Insurance	0.79		0.00		1.10	
Association Fees	3.00		2.72		2.82	
Land Tax	4.41		2.62		3.78	
Water Tax	10.00		8.10		4.78	
Bldg. & Equip. Ins.	7.09		7.84		9.76	
Utilities	6.60		5.30		6.76	
Miscellaneous	12.80		9.01		13.03	
Interest on Op. Cap.	41.75		38.52		45.21	
TOTAL	505.67	24.86/t	466.48	24.77/t	547.49	30.21/t

The Vauxhall area growers had relatively higher costs (Table 17) for seed, chemicals, machine operation, cash rent/crop share, crop insurance, building and equipment insurance, utilities, miscellaneous overhead, and interest on operating capital. Generally speaking, some sugar beet fields required re-seeding due to wind damage and poor germination. Unfortunately, most of this re-seeding occurred in the Vauxhall area and partly explains the higher seed costs, crop insurance, and machine operation costs that were observed for this area. In addition, the farms in this area are smaller in size and because of smaller sized equipment, higher costs were incurred for fuel and repairs. Higher trucking costs were also observed as some of the Vauxhall growers hauled their sugar beets to the Taber factory. These additional machine costs were only partially offset by the relatively higher hauling allowance income that was received by this group of growers. Cash rent/crop share costs for the Vauxhall growers were also significantly high compared to the two

other areas implying that a smaller portion of the sugar beets were grown on owned land. The smaller farms in the Vauxhall area had higher overhead costs for such items as insurance and utilities, and a higher interest charge on operating capital due to higher cash requirement. Growers in the Lethbridge area experienced the highest yield and this may be partly due to the the significantly higher fertilizer cost that they incurred. Also, the higher land and water taxes may indicate more productive land in the Coaldale - Lethbridge area. Cash costs ranged from $466.48 per acre in the Taber area to $547.49 per acre in the Vauxhall area.

Non-Cash Production Costs by Location

As indicated in Table 18, non-cash costs consist of operator's labour, machinery, building and land ownership.

TABLE 18: SUMMARY OF NON-CASH PRODUCTION COSTS BY LOCATION - 1981

	LETHBRIDGE AREA	TABER AREA	VAUXHALL AREA
	$ PER ACRE		
Operator's Labour	71.60	80.03	79.00
Machinery Ownership	176.54	199.64	213.28
Building Ownership	33.05	41.60	40.10
Land Ownership	112.18	80.03	50.02
TOTAL	393.37	401.30	382.40

The relatively smaller growers in the Taber and Vauxhall areas indicated higher operator labour cost per acre ($80.03 and $79.00, respectively), as compared to the Lethbridge area growers who reported a cost of $71.60 per acre. Land ownership cost was directly related to the proportion of sugar beet grown on owned land. As was shown in the cash cost section, the Lethbridge growers had the lowest cash rent/crop share cost and therefore, reported the highest owned land cost at $112.18 per acre. The Vauxhall area growers had the highest cash rent/crop share cost and thus reported the lowest owned land cost of $50.02 per acre.

Machinery interest and depreciation costs ranged from $176.54 per acre for the Lethbridge area to $213.28 per acre for the Vauxhall area. Again, because the Vauxhall area growers are relatively smaller in size, they had higher fixed overhead cost per acre when compared to the other two areas. Also, higher machine costs per acre can be anticipated for this area (Vauxhall), due to the additional cultural work that complements the re-seeding operation. Higher trucking costs were indicated by these growers as some of them chose to deliver their sugar beets to the Taber factory.

Summary of Costs and Returns by Location

Growers in the Vauxhall area had significantly higher cash costs when compared to the two other areas under study. Non-cash costs per tonne of sugar beets sold varied by less than $2.00 per tonne among the three areas. Total costs of production ranged from $44.20 per acre in the Lethbridge area to $51.32 per tonne in the Vauxhall area. As a result, Vauxhall area growers were short $7.54 per tonne of covering all their production costs, while the growers in the Lethbridge area were short $0.47 per tonne of covering their total production costs (see Table 16). The breakeven yields required to cover total production costs in the Taber, Lethbridge, and Vauxhall areas were 19.84, 20.56 and 21.24 tonnes per acre, respectively.

SECTION V

EFFECT OF ROTATION

The previous economic study done on sugar beet production (1975-1977), clearly indicated that the growing of sugar beets on vegetable or alfalfa stubble was very profitable. In fact, the group of growers utilizing vegetable or alfalfa land in 1977 realized a positive return of $64.59 per acre, while growers of sugar beets on grain stubble or summerfallow had negative returns to management.

In order to analyze the costs and returns for sugar beet production by rotation, the records obtained in 1981 were divided into the following groups: Summerfallow - 13 records; Vegetable (peas, beans, and corn) - 12 records; Grain Stubble - 22 records - (see Table 19).

Summary of Sugar Beet Returns by Rotation

Sugar beets grown on summerfallow land yielded an average of 20.1 tonnes per acre, which was 1.41 tonnes more than the sugar beet production reported on vegetable and grain stubble. However, sugar beets grown on vegetable land were more profitable in terms of total cost of production: $45.19 per tonne as compared to $47.54 per tonne for sugar beets grown on summerfallow land. On grain stubble, sugar beets yielded 18.42 tonnes per acre and had a total production cost of $49.07 per tonne. None of the three types of rotation studied were able to cover their total cost of production. The additional returns required per acre to cover all production costs were $21.40, $76.75, and $100.89 for the sugar beets grown on vegetable stubble, summerfallow, and grain stubble, respectively.

TABLE 19: SUMMARY OF COSTS AND RETURNS FOR SUGAR BEET PRODUCTION IN ALBERTA BY ROTATION - 1981

PREVIOUS CROP	Summerfallow		Vegetable Stubble		Grain Stubble	
ACRES ON FARM	36.5		56.7		58.62	
NUMBER OF FARMS	13		12		22	
	$ PER ACRE					
RETURNS						
Yield (t/Ac)	20.10		18.96		18.42	
Sugar Beet Sales	867.92		818.69		795.38	
Hauling Allowance	0.00		2.61		4.65	
Sugar Beet Tops	10.89		14.20		3.03	
TOTAL RETURNS	878.81	43.72/t	835.50	44.07/t	803.06	43.60/t
CASH COSTS						
Labour (Hired)	32.44		22.80		28.89	
Contract Work	71.06		58.98		69.58	
Materials	107.33		108.65		138.12	
Machine Cash	171.80		160.90		161.53	
Miscellaneous	120.16		105.30		127.29	
TOTAL CASH	502.79	24.99/t	456.03	24.05/t	525.42	27.72/t
NON-CASH COSTS						
Land	99.84		83.77		76.51	
Buildings	50.52		31.15		39.01	
Machinery	200.95		102.23		195.12	
Operator's Labour	101.46		84.12		67.89	
TOTAL NON-CASH	452.77	22.53/t	400.27	21.11/t	378.53	20.55/t
TOTAL COSTS	955.56	47.54/t	856.90	45.19/t	903.95	49.07/t
RETURN OVER CASH COSTS	376.02	18.71/t	379.47	20.01/t	277.64	15.07/t
RETURN TO MANAGEMENT	-76.75	-3.82/t	-21.40	-1.13/t	-100.89	-5.48/t
BREAKEVEN YIELD TO COVER ALL COSTS (t/Ac)	21.86		19.44		20.73	

Summary of Production Costs by Rotation

Sugar beets grown on summerfallow land had a significantly higher non-cash cost per acre at $452.77 as compared to $400.27 and $378.53 for sugar beets grown on vegetable and grain stubble respectively. First of all, this is accounted for by the fact that these were relatively smaller farms and secondly, there are higher machine, labour and land costs associated with previously summerfallow land. It was also observed that the material cost for sugar beets grown on grain stubble was $30.13 higher per acre than that reported for the other two groups. Of this difference, $15.16 is attributed to higher fertilizer cost.

SUMMARY

The main conclusions drawn from the 1981 sugar beet cost of production study are as follows:

1. Sugar beet production is generally considered as one of the main cash crops for farmers in the irrigated areas of southern Alberta;

2. Sugar beet growers in southern Alberta harvested a record yielding crop of 20.4 tonnes per acre which is 5 tonnes above the previous 5 year average.

3. The highest yield recorded in 1981 was 29.67 tonnes per acre in the Vauxhall area.

4. Despite the record yielding crop in 1981, growers were in a much more favourable financial position during the 1975 to 1980 time period.

5. Growers realized a negative return to management in 1981 of $59.46 per acre or $3.12 per tonne of sugar beet produced.

6. The most significant costs in sugar beet production are machinery operating and machinery ownership costs which when combined, account for 40 percent of the total production costs.

7. By analyzing costs on the basis of size, it was observed that farms that were above average size were able to grow sugar beets at considerably lower costs than the smaller farms, through the economies of labour, machine, and overhead costs that exist on larger farms. Also, the largest size group on study was the only group of growers that shared a positive return to management.

8. On the basis of average yields realized in the 1981 study, a breakeven price of $46.30 per tonne was required to cover all costs. The breakeven prices for sugar beets for the four size groups were as follows:

Group 1	1 - 39 Acres	$56.53/Tonne
Group 2	40 - 69 Acres	$49.13/Tonne
Group 3	70 - 99 Acres	$43.75/Tonne
Group 4	Over 100 Acres	$38.74/Tonne

9. As observed in previous studies, the growing of sugar beets on vegetable land was more profitable in 1981, as compared to sugar beets grown on summerfallow or grain stubble.

10. Sugar beet growers are continuously adopting labour saving management practices such as the use of chemicals, larger trucks for hauling, more cultural machine operations, etc. Some of these newer practices will reduce the cash expense and increase the non-cash costs of machine ownership.

11. Table 20, presents costs and returns for sugar beet production for the period 1979 to 1981 inclusive. It indicates that the price for sugar beets is decreasing rapidly (22 percent per year), while costs are increasing (21 percent per year). As a result, the return over all costs has been estimated to have fallen from $563.91 per acre to $-59.46 per acre over the three year period.

TABLE 20: SUMMARY OF COSTS AND RETURNS FOR SUGAR BEET PRODUCTION IN ALBERTA FROM 1979-1981

	1979		1980		1981[1]	
	$/ACRE		$/ACRE		$/ACRE	
RETURNS						
Yield	15.72		15.52		19.05	
Sugar Beet Sales	1163.91		1039.68		826.44[2]	
Sugar Beet Tops	8.33		1.52		7.09	
TOTAL RETURNS	1172.24	74.57/t	1041.20	67.09/t	833.53	43.75/t
CASH COSTS						
Labour (Hired)	78.93		117.26		95.81	
Materials	76.71		79.01		123.33	
Machine Cash	103.50		145.77		161.51	
Miscellaneous	36.00		36.38		118.08	
TOTAL CASH	295.14	18.77/t	378.42	24.38/t	498.73	26.18/t
NON-CASH COSTS						
Land	94.50		103.47		82.76[3]	
Buildings	11.68		12.17		38.56	
Machinery	148.20		167.93		195.80	
Operator's Labour	58.51		63.24		77.15	
TOTAL NON-CASH	313.19	19.92/t	346.81	22.35/t	394.27	20.70/t
TOTAL COSTS	608.33		725.23		892.99	
TOTAL COSTS	38.70/t		46.73/t		46.88/t	
RETURN OVER CASH COSTS	877.10		662.78		334.80	
RETURN OVER CASH COSTS	55.80/t		42.70/t		17.57/t	
RETURN OVER ALL COSTS	563.91		315.97		-59.46	
RETURN OVER ALL COSTS	35.87/t		20.36/t		-3.12/t	

(1) 1981 cost data is based on actual cost data for 51 sugar beet growers while the 1979 and 1980 data are as a result of indexing group average data collected in 1977.

(2) Returns from the 1981 sugar crop were $43.18 per tonne.

(3) Interest on land investment was calculated using 7 percent of its market value.